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Firefighters' Unified Retirement System



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FIREFIGHTERS' UNIFIED
RETIREMENT SYSTEM

ACTUARIAL VALUATION

AS OF

JULY 1, 1988

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Hendrickson, Miller
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ACTUARIAL CONSULTANTS



TABLE OF CONTENTS

	<u>Page</u>
<u>SECTION I</u>	
Introduction	I
Actuarial Certification	1
<u>SECTION II</u>	
Analysis of Valuation	2
<u>SECTION III</u>	
Schedule 1 - Normal Cost Allocation	4
Schedule 2 - Present Value of Benefits	5
Schedule 3 - Liability Allocation and Statutory Funding	6
Schedule 4 - Unfunded Liability Amortization Schedule	7
Schedule 5 - Comparison of Valuations	8
Schedule 6 -	
Table 1 - Number of Active Members	11
Table 2 - Average Salaries of Active Members	12
Table 3 - Annual Salaries of Active Members	13
Table 4 - Number of Vested Inactive Members	14
Table 5 - Summary of Retirees	15
Table 6 - Summary of Disabled	16
Table 7 - Summary of Survivors	17
<u>SECTION IV</u>	
Actuarial Funding Method and Assumptions	18
<u>SECTION V</u>	
Summary of Benefit Provisions	22

SECTION I

INTRODUCTION

An actuarial valuation of the Firefighters' Unified Retirement System of the State of Montana has been completed as of July 1, 1988. This valuation was authorized by the Public Employees' Retirement Board under Section 19-13-504, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1988.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.

In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Firefighters' Unified Retirement Act and incorporates all amendments as of July 1, 1988. A summary of the major provisions of the Act is contained in Section V.

ACTUARIAL CERTIFICATION

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Firefighters' Unified Retirement System as of July 1, 1988.

Alton P. Hendrickson
Member, American Academy
of Actuaries

SECTION II

ANALYSIS OF VALUATION

Results of Valuation

An actuarial valuation as of July 1, 1988 has been conducted for the Fire-fighters' Unified Retirement System. This valuation has determined that the percentage of each member's salary required to fund the benefits as they accrue in the future is 21.170%. The regular contribution rate of 42.00% allows 20.830% to be applied to the unfunded past service liability. This percentage is sufficient to amortize the unfunded past service liability over a period of 34.25 years. This period has decreased from 40.23 years in 1986.

An amortization schedule has been prepared which will fund the liability as of July 1, 1984 over a remaining period of 36 years. The liability attributable to 1986 will be amortized over a remaining period of 38 years. A new liability of \$1,503,355 was determined as of July 1, 1988. This will be amortized over a 40-year period. The total contribution rate as a percentage of salary required to meet this schedule is 41.204%. This is a decrease from the required rate of 42.898% in 1986. The schedule is illustrated on page 7.

The variations between this valuation and that of July 1, 1986 are the results of the experience of the Firefighters' Unified Retirement System versus the expected, as well as a change in the actuarial assumptions.

Actuarial Modifications

A report was prepared on noneconomic actuarial assumptions as of June 30, 1987. This report recommended changes in the mortality, disability, withdrawal and retirement rates assumptions. These assumptions were approved by the board as discussed below.

- a. Mortality Rates. Since 1978, the basis for mortality assumptions had been the 1971 Group Annuity Mortality Table. These rates were set back one year to reflect increased longevity. The new mortality basis is the 1983 Group Annuity Mortality Table which reflects recent experience on a national basis. This table is more conservative than the previous basis and anticipates increased longevity.

This change increased the system's liability by \$1.0 million and increased the funding period by 1 year.

- b. Disability. Previous disability rate assumptions were based upon rates published by the Railroad Retirement Board in its seventh valuation of its retirement system. These rates anticipated disabilities higher than actually experienced by the Public Employees' Retirement System. The new basis is the 1983 Disability Table which anticipates fewer disabilities.

This change decreased the system's liability by \$.1 million and decreased the funding period .2 years.

- c. The future salary increase assumption continues at 6 1/2% per annum. No provision was made for a select rate at a lower level for the next few years. Also, the meritorious and longevity increase assumption of 3/4 of 1% has been eliminated. The net impact of this change was a decrease in the system's liability of \$2.3 million and a reduction in the funding period of 6.5 years.

The overall effect of the actuarial assumption modifications was a decrease in the system's liability of \$1.4 million and a reduction in the funding period of 5.7 years. Had these changes not been made, the funding of the unfunded liability would have occurred over a period of 39.97 years compared to 34.25 as determined by this valuation.

Summary of Data

The active membership grew from 421 members in 1986 to 429 members, with an annual payroll of \$9.7 million. There are 224 retired members, 109 disabled members and 32 individuals receiving survivor benefits. The total annual benefit payout as of July 1, 1988 was \$3.0 million.

Conclusion

The Firefighters' Unified Retirement System continues to make good progress in its funding position. All members employed prior to July 1, 1981 continue to enjoy a minimum retirement benefit equal to 1/2 of the regular monthly salary paid to a newly confirmed active firefighter in the city in which the member was employed. The cost of this adjustment for members retired prior to July 1, 1973 is paid by the state auditor. It is important that this benefit continue to be monitored for members who retire after July 1, 1973 in as much as these benefits do impact the overall funding position of this system.

SECTION III
Firefighters' Unified Retirement System

SCHEDULE 1
NORMAL COST ALLOCATION

(1)	Normal Cost Contribution Rate:	
(a)	Retirement	18.707%
(b)	Death	0.740
(c)	Disability	1.335
(d)	Vested	0.236
(e)	Withdrawals	0.152

(f)	Total Rate	21.170%
(2)	Present Value of Future Salaries Of Current Members	\$ 87,106,614
(4)	Present Value of Future Normal Costs For Current Members (1(f) * (2))	\$ 18,440,470

Firefighters' Unified Retirement System

SCHEDULE 2
PRESENT VALUE OF BENEFITS

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 26,843,700
(b) Death	1,851,215
(c) Disability	11,482,330
(d) Vested	271,207
(e) Withdrawals	934

(f) Total Inactive	\$ 40,449,386

(2) Present Value of Benefits - Active Members

(a) Retirement	\$ 54,937,963
(b) Death	1,419,580
(c) Disability	2,521,230
(d) Vested	443,575
(e) Withdrawals	175,095

(f) Total Active	\$ 59,497,443

(3) Total Liabilities \$ 99,946,829

Firefighters' Unified Retirement System

SCHEDULE 3
LIABILITY ALLOCATION AND STATUTORY FUNDING

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$ 99,946,829
(b) Present Value of Future Normal Costs	\$ 18,440,470
(c) Fund Assets	\$ 26,758,606

(d) Unfunded Liability (a)-(b)-(c)	\$ 54,747,753

(2) Contribution Rates Amortized over 34.25 Years

(a) Present Value of Salaries During Next 34.25 Years	\$ 262,831,283
(b) Unfunded Contribution Rate 1(d)/2(a)	20.830%
(c) Normal Cost Rate (Schedule 1)	21.170

(d) Statutory Funding Rate	42.000%

Firefighters' Unified Retirement System

SCHEDULE 4

UNFUNDED LIABILITY AMORTIZATION SCHEDULE

(1) 1984 Unfunded Past Service Liability Account

(a)	1984 Liability Account as of 7/1/86	\$ 51,182,951
(b)	Interest Charge on Liability Account	8,516,842
(c)	Contributions during Biennium Allocated to Unfunded Liability	3,924,234
(d)	Interest Credit on Contributions	302,637
(e)	1984 Liability Account as of 7/1/88	\$ 55,472,922

(2) 1986 Unfunded Past Service Liability Account

(a)	1986 Liability Account as of 7/1/86	\$ -2,056,166
(b)	Interest Charge on Liability Account	-342,147
(c)	Contributions during Biennium Allocated to Unfunded Liability	-157,632
(d)	Interest Credit on Contributions	-12,157
(e)	1986 Liability Account as of 7/1/88	\$ -2,228,524

(3) Actuarial Gain/Loss

(a)	Actual Unfunded Liability (Schedule 3)	\$ 54,747,753
(b)	1984 Liability Account as of 7/1/88	55,472,922
(c)	1986 Liability Account as of 7/1/88	-2,228,524
(d)	1988 Liability Account as of 7/1/88	\$ 1,503,355

(4) Required Contribution Rate

(a)	Normal Cost Rate (Schedule 1)	21.170%
(b)	Rate to Fund 1984 Liability Account Over 36-Year Period	20.309
(c)	Rate to Fund 1986 Liability Account Over 38-Year Period	-0.783
(d)	Rate to Fund 1988 Liability Account Over 40-Year Period	0.508
(e)	Total Contribution Rate	41.204%

Firefighters' Unified Retirement System

SCHEDULE 5

TABLE 1

COMPARISON OF VALUATIONS

	<u>1986</u>	<u>1988</u>
Liability for Future Service	\$19,466,921	\$18,440,470
Unfunded Liability	\$49,126,785	\$54,747,753
Years Required to Pay Off Unfunded Liability	40.23	34.25
Assets	\$20,555,380	\$26,758,606
Normal Cost Rate	22.02%	21.17%
Unfunded Liability Rate	20.88%	20.83%
Total Recommended Rate	42.90%	42.00%
Annual Payroll	\$ 8,934,728	\$ 9,662,859
Annual Benefits	\$ 3,535,407	\$ 3,004,860
Number of Active Members	421	429
Number of Retired Members	211	224
Number of Disabled Members	112	109
Number of Survivor Benefits	34	32

Firefighters' Unified Retirement System

TABLE 2
MEMBERSHIP COMPARISON
ACTIVE MEMBERS

City	1986		1988	
	Active Members	Annual Payroll	Active Members	Annual Payroll
Anaconda	10	\$ 214,218	8	\$ 192,607
Billings	94	\$2,213,891	96	\$2,401,187
Bozeman	23	\$ 522,280	22	\$ 521,225
Butte	38	\$ 761,617	35	\$ 859,721
Glendive	24	\$ 138,115	23	\$ 179,295
Great Falls	71	\$1,711,208	71	\$1,776,563
Havre	17	\$ 304,803	17	\$ 316,335
Helena	32	\$ 711,973	32	\$ 802,776
Kalispell	20	\$ 445,864	19	\$ 434,884
Lewistown	17	\$ 249,454	17	\$ 292,404
Livingston	10	\$ 175,213	12	\$ 206,325
Miles City	16	\$ 306,292	17	\$ 320,607
Missoula	56	\$1,248,253	56	\$1,297,191
Red Lodge	2	\$ 32,760	4	\$ 61,739
Total	421	\$8,934,728	429	\$9,662,859

Firefighters' Unified Retirement System

TABLE 3
MEMBERSHIP COMPARISON
MEMBERS RECEIVING BENEFITS

City	1986		1988	
	Inactive Members	Annual Benefit	Inactive Members	Annual Benefit
Anaconda	17	\$ 182,759	16	\$ 193,194
Billings	71	\$ 787,796	77	\$ 905,046
Bozeman	12	\$ 142,215	11	\$ 135,842
Butte	45	\$ 484,904	42	\$ 503,752
Glendive	21	\$ 66,266	23	\$ 80,821
Great Falls	64	\$ 668,440	68	\$ 803,646
Havre	13	\$ 124,494	9	\$ 91,062
Helena	25	\$ 255,382	26	\$ 280,847
Kalispell	19	\$ 202,256	20	\$ 229,071
Lewistown	12	\$ 65,057	13	\$ 68,382
Livingston	9	\$ 68,178	8	\$ 62,079
Miles City	16	\$ 132,535	15	\$ 131,368
Missoula	29	\$ 323,925	32	\$ 391,862
Red Lodge	4	\$ 31,200	5	\$ 34,598
Total	357	\$3,535,407	365	\$3,911,570

SCHEDULE 6

TABLE 1

Firefighters' Unified Retirement System

Number of Active Members

Completed Years of Service	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	OVER 65	Total
0-4	7	44	35	18	5	1					110
5-9		10	28	22	5	1					66
10-14		1	19	38	26	8	2				94
15-19			1	13	45	24	3				86
20-24					10	32	7				49
25-29						6	8	3			17
30-34							2	2	1		5
35-39								1	1		2
40-UP											
TOTAL	7	55	83	91	91	72	22	6	2		429

TABLE 2
 Firefighters' Unified Retirement System
 Average Salaries of Active Members

Completed Years of Service		Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	OVER 65	Total
0-4		20895	18185	18768	16606	17091	16542					18220
5-9			20789	22120	23069	14154	2427					21333
10-14			25639	24213	23470	22185	15039	2303				22120
15-19				26839	25419	25313	25549	16742				25114
20-24					26787	27545	28073					27466
25-29						29059	30155	28299				29441
30-34							28152	29705	2516			23646
35-39								22196	24925			23560
40-UP												
TOTAL		20895	18794	21242	22294	23516	25115	24949	27751	13720		22524

TABLE 3
 Firefighters' Unified Retirement System
 Annual Salaries of Active Members
 In Thousands

Completed Years of Service		Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	OVER 65	Total
0-4		146	800	657	299	85	17					2004
5-9			208	619	508	71	2					1408
10-14			26	460	892	577	120	5				2080
15-19				27	330	1139	613	50				2159
20-24						268	881	197				1346
25-29							174	241	85			500
30-34								56	59	3		118
35-39									22	25		47
40-UP												
TOTAL		146	1034	1763	2029	2140	1807	549	166	28		9662

TABLE 4
 Firefighters' Unified Retirement System
 Number of Vested Inactive Members

Completed Years of Service Under	25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	OVER 65	Total
0-4											
5-9											
10-14					1	2	1			1	5
15-19											
20-24											
25-29											
30-34											
35-39											
40-UP											
TOTAL					1	2	1			1	5

TABLE 5
 Firefighters' Unified Retirement System
 Summary of Retirees

Number of Members									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
35	45	44	34	22	16	22	6	224	
Total Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
35845	43203	39607	27458	18428	13395	18226	5055	201218	
Average Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
1024	960	900	808	838	837	828	842	898	

TABLE 6
 Firefighters' Unified Retirement System
 Summary of Disabled

Number of Members									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
34	14	19	10	10	10	5	7	109	

Total Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
32285	11948	15958	8570	8563	8791	4213	6178	96507	

Average Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
950	853	840	857	856	879	843	883	885	

TABLE 7
 Firefighters' Unified Retirement System
 Summary of Survivors

Number of Members									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
7	1	5	0	7	3	5	4	32	

Total Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
5893	913	4363	0	6393	2738	4557	3382	28239	

Average Monthly Benefit									
Age Group									
Under 55	55-59	60-64	65-69	70-74	75-79	80-84	Over 84	Total	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
842	913	873	0	913	913	911	846	882	

SECTION IV
ACTUARIAL FUNDING METHOD AND ASSUMPTIONS

The true cost of the Firefighters' Unified Retirement System will be determined by its future experience. In determining the financial requirement of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the basic assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected future costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions shown below were based upon the past experience of the fund together with the projections as to future experience.

Funding Method

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost of each fund as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present assets of the fund and the present value of expected future contributions for the normal cost.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to meet the normal cost in addition to making progress towards the amortization of the unfunded liability.

DISCUSSION OF ACTUARIAL ASSUMPTIONS

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, and apply to both active members and those receiving benefits. These rates have longer life expectancies than the 1971 Group Annuity Table used in the previous valuation.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table and anticipate fewer disabilities than the previous rates as published by the Railroad Retirement Board.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1987 withdrawal experience study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8%.

Termination Benefits

It was assumed that all members terminating with less than ten years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with ten or more years of service would select the most advantageous benefits under the given assumptions.

ILLUSTRATION OF ACTUARIAL ASSUMPTIONS

Mortality Rates

The mortality rates are based upon the 1983 Group Annuity Mortality Table.

<u>Age</u>	<u>Deaths Per 10,000 Male Members</u>	<u>Deaths Per 10,000 Female Members</u>
25	5	3
30	6	3
35	9	5
40	12	7
45	22	10
50	39	16
55	61	25
60	92	42
65	156	71
70	275	124
75	446	240
80	741	429
85	1,148	699

Disability Rates

The disability rates are based upon the 1983 Disability Table.

<u>Age</u>	<u>Disabilities per 10,000 Male Members</u>	<u>Disabilities per 10,000 Female Members</u>
25	1	1
30	2	3
35	3	5
40	6	9
45	12	15
50	20	22
55	51	41
60	105	87

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Firefighters' Unified Retirement System.

<u>Age</u>	<u>Withdrawals Per 100,000 Active Members</u>
25	7,380
30	4,248
35	2,169
40	495
45	270
50	0
55	0

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8%.

SECTION V

SUMMARY OF BENEFITS AND CONTRIBUTIONS

Member Contributions -	6% of salary.
City Contributions -	13.02% of active firefighters' salaries.
State Contributions -	22.98% of active firefighters' salaries, plus any amounts required to fund excess past service liabilities.
Retirement Benefit -	<p>Minimum age: 50 Minimum service: 10 years</p> <p>Normal form: Life payments to the member and, upon the member's death, continuing to the surviving spouse. In the event there is no surviving spouse, or the spouse subsequently dies or remarries, payments continue to dependent children, if any.</p> <p>Benefit: A member who was hired prior to July 1, 1981, and who retires after attaining age 50 and completing 20 years of service, will receive a benefit equal to 50% of the monthly salary last received by the member, plus an additional 1% for each year of service in excess of 20 years, up to a maximum of 60%.</p> <p>A member who was hired on or after July 1, 1981, or who retires prior to completing 20 years of service, will receive a benefit equal to 2% of average salary for each year of service up to a maximum of 60%. Salary is averaged over the last 36 months of membership for those hired on or after July 1, 1981.</p>
Disability Benefit -	Greater of 50% of the average monthly salary or the accrued retirement benefit.
Death Benefit -	50% of the average monthly salary, payable to surviving spouse or minor children.

Termination Benefit -

Prior to completion of 10 years of service, return of accumulated contributions with interest. After completion of 10 years of service, member elect to receive a retirement benefit at age 50 equal to 2% of salary for each year of service.

Benefit Adjustments -

In the event the benefits provided above to a member hired prior to July 1, 1981, or such member's beneficiary, are less than one-half of the regular monthly salary paid to a newly confirmed active firefighter in the city in which the member was employed, the monthly payments shall be increased to one-half of such monthly salary.

The cost of this adjustment for members retired prior to July 1, 1973 is paid by the state auditor.